This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1-67. (Canceled).

68. (Currently Amended) A method of designing a direct expansion geothermal heat exchange system having a heating mode and a cooling mode, the method comprising:

providing an interior air heat exchanger;

providing an exterior, subterranean heat exchanger;

~~providing~~ charging the system with a refrigerant ~~with heating/cooling operational working pressures between 80 psi and 405 psi~~ so that the refrigerant has a head pressure in the cooling mode of approximately 305-405 psi, and a suction pressure in the heating mode of approximately 80-160 psi.

69. (Previously Presented) The method of claim 68, further comprising providing an R-410A refrigerant.

70. (Currently Amended) The method of claim 68, further comprising providing a polyolester oil ~~for use in conjunction with a~~ in the direct expansion system ~~comprising providing a refrigerant with heating/cooling operational working pressures between 80 psi and 405 psi~~.

71. (Currently Amended) The method of claim 68, further comprising providing a single piston metering device in the heating mode, with ~~the following~~ a pin restrictor (Aeroquip type) sizing as follows, based on central hole bore size in inches, utilized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, within the following depth ranges:

Maximum Heating Tonnage Design…….Pin Restrictor Central Bore Hole Size in Inches

*0 to 50 feet (depth of borehole below compressor unit)

1.5……..0.041

2……0.049

2.5……..0.055

3……0.059

3.5……..0.063

4……0.065

4.5……..0.068

5……0.071

*51 to 175 feet (depth of borehole below compressor unit)

1.5……..0.039

2……0.047

2.5……..0.052

3……0.056

3.5……..0.060

4……0.062

4.5……..0.065

5……0.067

*176 to 300 feet (depth of borehole below compressor unit)

1.5……..0.037

2……0.044

2.5……..0.050

3……0.053

3.5……..0.057

4……0.059

4.5……..0.061

5……0.064

72. (Currently Amended) The method of claim 68, further comprising providing, in the cooling mode, a self-adjusting thermostatic expansion valve which is located proximate to the interior ~~air handler~~ heat exchanger and is sized at 140%, plus or minus 10% of 100%, of ~~the~~ a maximum compressor tonnage design capacity in the cooling mode;

providing a single piston metering device situated proximate to the interior ~~air handler~~ heat exchanger in the cooling mode, with ~~the following~~ a pin restrictor (Aeroquip type) sizing as

follows, based on central hole bore size in inches, utilized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, within the following depth ranges:

Maximum Cooling Tonnage Design - Pin Restrictor Size in Inches

*0 to 50 feet (height of interior air handler above the compressor unit)

1.5……..0.058

2……0.070

2.5……..0.077

3……0.085

3.5……..0.093

4……0.099

4.5……..0.100

5……0.112

73. (Currently Amended) The method of claim 68, ~~further comprising providing a~~ in which charging ~~of~~ the ~~refrigerant~~ system further includes obtaining ~~in the cooling mode until the~~ a peak operational efficiency in the cooling mode with a ~~is reached and the~~ superheat ~~is within the~~ of approximately 10 to 25 degrees F, ~~degree F range, the head pressure is within the 305 to 405 PSI range, the liquid~~ a head pressure ~~is within the~~ in the heating mode of approximately 195 to 275 PSI ~~range, which is similar to the head pressure range in the heating mode~~, ~~the~~ a suction pressure ~~is within the~~ in the cooling mode of approximately 80 to 160 PSI ~~range~~, and ~~the~~ a suction/vapor temperature ~~is within the~~ of approximately 37 ~~degree~~ to 55 ~~degree~~ degrees F. ~~temperature range.~~

74-78. (Canceled).

79. (Currently Amended) A direct expansion geothermal heat exchange system having a heating mode and a cooling mode, the system comprising:

an interior air heat exchanger;

an exterior, subterranean heat exchanger; and

a refrigerant ~~with heating/cooling operational working pressures between 80 psi and 405 psi~~ disposed in the system and sufficiently charged to have a head pressure in the cooling mode of approximately 305-405 psi, and a suction pressure in the heating mode of approximately 80-160 psi.

80. (Currently Amended) The system of claim 79, ~~further comprising~~ in which the refrigerant comprises an R-410A refrigerant.

81. (Currently Amended) The system of claim 79, further comprising a polyolester oil ~~for use in conjunction with a~~ in the direct expansion system ~~comprising providing a refrigerant with heating/cooling operational working pressures between 80 psi and 405 psi~~

82. (Currently Amended) The system of claim 79, further comprising a single piston metering device in the heating mode, with ~~the following~~ a pin restrictor (Aeroquip type) sizing as follows, based on central hole bore size in inches, utilized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, within the following depth ranges:
Maximum Heating Tonnage Design…….Pin Restrictor Central Bore Hole Size in Inches
*0 to 50 feet (depth of borehole below compressor unit)
1.5……..0.041
2…….0.049
2.5……..0.055
3…….0.059
3.5……..0.063
4…….0.065
4.5……..0.068
5…….0.071

*51 to 175 feet (depth of borehole below compressor unit)

1.5……..0.039

2……0.047

2.5……..0.052

3……0.056

3.5……..0.060

4……0.062

4.5……..0.065

5……0.067

*176 to 300 feet (depth of borehole below compressor unit)

1.5……..0.037

2……0.044

2.5……..0.050

3……0.053

3.5……..0.057

4……0.059

4.5……..0.061

5……0.064

83. (Currently Amended) The system of claim 79, further comprising, in the cooling mode, a self-adjusting thermostatic expansion valve which is located proximate to the interior ~~air handler~~ heat exchanger and is sized at 140%, plus or minus 10% of 100%, of ~~the~~ a maximum compressor tonnage design capacity in the cooling mode;

providing a single piston metering device situated proximate to the interior ~~air handler~~ heat exchanger in the cooling mode, with ~~the following~~ a pin restrictor (Aeroquip type) sizing as follows, based on central hole bore size in inches, utilized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, within the following depth ranges:

Maximum Cooling Tonnage Design - Pin Restrictor Size in Inches

*0 to 50 feet (height of interior air handler above the compressor unit)

1.5……..0.058

2.....0.070

2.5.....0.077

3.....0.085

3.5.....0.093

4.....0.099

4.5.....0.100

5.....0.112

84. (Currently Amended) The system of claim ~~68~~ 79, further comprising charging the ~~refrigerant~~ system with the refrigerant to obtain ~~in the cooling mode until the~~ a peak operational efficiency in the cooling mode with a ~~is reached and the~~ superheat ~~is within the~~ of approximately 10 to 25 degrees F, ~~degree F range, the head pressure is within the 305 to 405 PSI range, the liquid~~ a head pressure ~~is within the~~ in the heating mode of approximately 195 to 275 PSI ~~range, which is similar to the head pressure range in the heating mode~~, ~~the~~ a suction pressure ~~is within the~~ in the cooling mode of approximately 80 to 160 PSI ~~range~~, and ~~the~~ a suction/vapor temperature ~~is within the~~ of approximately 37 ~~degree~~ to 55 ~~degree~~ degrees F. ~~temperature range.~~

85. (Currently Amended) A method of designing a direct expansion geothermal heat exchange system having a cooling mode and a heating mode, the method comprising:

providing an R-410A refrigerant; and

providing a single piston metering device in the heating mode, with ~~the following~~ a pin restrictor (Aeroquip type) sizing as follows, based on central hole bore size in inches, utilized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, within the following depth ranges:

Maximum Heating Tonnage Design…….Pin Restrictor Central Bore Hole Size in Inches

*0 to 50 feet (depth of borehole below compressor unit)

1.5……..0.041

2……0.049

2.5……..0.055

3……0.059

3.5……..0.063

4……0.065

4.5……..0.068

5……0.071

*51 to 175 feet (depth of borehole below compressor unit)

1.5……..0.039

2……0.047

2.5……..0.052

3……0.056

3.5……..0.060

4……0.062

4.5……..0.065

5……0.067

*176 to 300 feet (depth of borehole below compressor unit)

1.5……..0.037

2……0.044

2.5……..0.050

3……0.053

3.5……..0.057

4……0.059

4.5……..0.061

5……0.064

86. (Currently Amended) A method of designing a direct expansion geothermal heat exchange system having a cooling mode and a heating mode, the method comprising:

providing an R-410A refrigerant; and

~~providing a~~ charging ~~of~~ the ~~refrigerant~~ system with the refrigerant to obtain ~~in the cooling mode until the~~ a peak operational efficiency in the cooling mode with a ~~is reached and the~~ superheat ~~is within the~~ of approximately 10 to 25 degrees F, ~~degree F range, the head pressure is within the 305 to 405 PSI range, the liquid~~ a head pressure ~~is within the~~ in the heating mode of approximately 195 to 275 PSI ~~range, which is similar to the head pressure range in the heating mode~~, ~~the~~ a suction pressure ~~is within the~~ in the cooling mode of approximately 80 to 160 PSI ~~range~~, and ~~the~~ a suction/vapor temperature ~~is within the~~ of approximately 37 ~~degree~~ to 55 ~~degree~~ degrees F. ~~temperature range.~~

87. (Currently Amended) A method of designing a direct expansion geothermal heat exchange system having a cooling mode and a heating mode, the method comprising:

providing a refrigerant with heating/cooling operational working pressures between 80 psi and 405 psi; and

providing a single piston metering device in the heating mode, with ~~the following~~ a pin restrictor (Aeroquip type) sizing, based on central hole bore size in inches, utilized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, within the following depth ranges:

Maximum Heating Tonnage Design…….Pin Restrictor Central Bore Hole Size in Inches

*0 to 50 feet (depth of borehole below compressor unit)

1.5……..0.041

2……0.049

2.5……..0.055

3……0.059

3.5……..0.063

4……0.065

4.5……..0.068

5……0.071

*51 to 175 feet (depth of borehole below compressor unit)

1.5……..0.039

2……0.047

2.5……..0.052

3……0.056

3.5……..0.060

4……0.062

4.5……..0.065

5……0.067

*176 to 300 feet (depth of borehole below compressor unit)

1.5……..0.037

2.....0.044

2.5.....0.050

3.....0.053

3.5.....0.057

4.....0.059

4.5.....0.061

5.....0.064

88. (Currently Amended) A method of designing a direct expansion geothermal heat exchange system having a cooling mode and a heating mode, the method comprising:

providing a refrigerant with heating/cooling operational working pressures between 80 psi and 405 psi; and

~~providing a~~ charging ~~of~~ the ~~refrigerant~~ system ~~in the cooling mode until the~~ with the refrigerant to obtain a peak operational efficiency in the cooling mode with a ~~is reached and the~~ superheat ~~is within the~~ of approximately 10 to 25 degrees F, ~~degree F range, the head pressure is within the 305 to 405 PSI range, the liquid~~ a head pressure ~~is within the~~ in the heating mode of approximately 195 to 275 PSI ~~range, which is similar to the head pressure range in the heating mode~~, ~~the~~ a suction pressure ~~is within the~~ in the cooling mode of approximately 80 to 160 PSI ~~range~~, and ~~the~~ a suction/vapor temperature ~~is within the~~ of approximately 37 ~~degree~~ to 55 ~~degree~~ degrees F. ~~temperature range.~~

89. (Currently Amended) A method of designing a direct expansion geothermal heat exchange system having a cooling mode and a heating mode, the method comprising:

providing an interior air heat exchanger;

providing an exterior, subterranean heat exchanger, the exterior heat exchanger including heat exchange tubing, at least a portion of the heat exchange tubing having a subterranean depth of approximately 100-300 feet; and

~~providing~~ charging the system with an R-410A refrigerant until the refrigerant has a head pressure in the cooling mode of approximately 305-405 psi, and a suction pressure in the heating mode of approximately 80-160 psi~~; and~~

~~utilizing the R-410A refrigerant in the refrigerant heat exchange tubing of a direct expansion geothermal heat change system wherein the refrigerant heat exchange tubing extends to depths of approximately 100-300 feet below the surface~~.

90. (Currently Amended) A direct expansion geothermal heat exchange system having a cooling mode and a heating mode, the system comprising:

an interior air heat exchanger;

an exterior, subterranean heat exchanger, the exterior heat exchanger including heat exchange tubing, at least a portion of the heat exchange tubing having a subterranean depth of approximately 100-300 feet; and

an R-410A refrigerant disposed in the system, the R-410A refrigerant having a charge sufficient to obtain a head pressure in the cooling mode of approximately 305-405 psi, and a suction pressure in the heating mode of approximately 80-160 psi~~; and~~

~~refrigerant heat exchange tubing positioned approximately 100-300 feet below the surface~~.